

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims**

1. (original) A modulator-amplifier configured for use in parametric sound reproduction systems for reproducing audio information in a medium, comprising:
  - an input configured for receiving at least one input signal including audio information;
  - at least one reference signal generator configured for generating at least one reference signal;
  - at least one comparator coupled to the input and the reference signal generator configured for detecting a relationship between a first signal based on the at least one input signal and the at least one reference signal and generating a second signal based thereon;
  - at least one switching power stage coupled to the at least one comparator and configured to receive the second signal and drive an output signal including at least one sideband and audio information; and
  - wherein the relationship between the at least one input signal and the timing of state transitions in the switching power stage is non-linear.
2. (original) A modulator-amplifier as set forth in claim 1, wherein the medium comprises air.
3. (original) A modulator-amplifier as set forth in claim 1, wherein the medium comprises water.
4. (original) A modulator-amplifier as set forth in claim 1, wherein the output signal comprises two sidebands.
5. (original) A modulator-amplifier as set forth in claim 1, wherein the output signal comprises two sidebands and satisfies at least one condition of a) the audio information being divided between the two sidebands unevenly and b) the strength of the signal is divided between the two sidebands unevenly.
6. (original) A modulator-amplifier as set forth in claim 1, wherein the modulator-amplifier is configured for either single sideband (SSB) or double sideband (DSB) modulation.

7. (original) A modulator-amplifier as set forth in claim 1, wherein the second signal is one of bi-level, tri-level, 4-level, and 5-level.
8. (original) A modulator-amplifier as set forth in claim 1, wherein the at least one reference signal has a periodic waveform that is one of sinusoidal, triangle and rectiform.
9. (original) A modulator-amplifier as set forth in claim 1, wherein the modulator-amplifier is implemented with analog electronic components.
10. (original) A modulator-amplifier as set forth in claim 1, wherein the modulator-amplifier is implemented with at least one digital electronic component.
11. (original) A modulator-amplifier as set forth in claim 10, wherein the at least one digital electronic component comprises a gate array.
12. (original) A modulator-amplifier as set forth in claim 11, wherein the gate array is field-programmable.
13. (original) A modulator-amplifier as set forth in claim 1, wherein the at least one reference signal generator further comprises a carrier level controller, whereby output power can be varied by varying the amplitude of the at least one reference signal.
14. (original) A modulator-amplifier as set forth in claim 1, wherein output power can be varied by varying amplitude of the output signal.
15. (original) A modulator-amplifier as set forth in claim 14, wherein the output power can be adjusted by adjusting a voltage swing between states in the at least one switching power stage.
16. (original) A modulator-amplifier as set forth in claim 1, wherein output signal amplitude is multiplied by an integer value in the at least one switching power stage.

17. (original) A modulator-amplifier as set forth in claim 1, further comprising a signal processor in communication with the input which generates a level signal based on the level of the at least one input signal, wherein the at least one reference signal is amplitude modulated in accordance with the level signal.

18. (original) A modulator-amplifier as set forth in claim 17, wherein the at least one reference signal generator modulates amplitude of the at least one reference signal based upon the at least one input signal, thereby adjusting power in the output signal.

19. (original) A modulator-amplifier as set forth in claim 1, wherein a switching frequency of the switching power output stage is less than ten times a frequency of the at least one reference signal.

20. (original) A modulator-amplifier as set forth in claim 19, wherein the switching frequency of the switching power output stage is less than 6 times the frequency of the at least one reference signal.

21. (original) A modulator-amplifier as set forth in claim 1, wherein the non-linear relationship is based on an arcsine function.

22. (original) A modulator-amplifier as set forth in claim 1, wherein the non-linear relationship is selected to minimize switching-induced distortion of audio information in the output signal.

23. (original) A modulator-amplifier as set forth in claim 1, wherein the at least one input signal comprises a sinusoidal waveform.

24. (original) A modulator-amplifier as set forth in claim 1, wherein the at least one input signal comprises an in-phase signal and a quadrature signal.

25. (original) A modulator-amplifier as set forth in claim 1, further comprising a protection circuit coupled to the at least one switching power stage configured for resetting or turning off the at least one switching power stage when input power deviates from a pre-selected range of parameter values.

26. (original) A modulator-amplifier as set forth in claim 1, wherein the modulator-amplifier is operable as one of:

- a band-pass amplifier;
- a part of one of an AM transmitter and SSB transmitter;
- a part of a SONAR system;
- a part of a diagnostic ultrasound system; and
- a frequency translating amplifier.

27. (original) A modulator-amplifier as set forth in claim 1, wherein output signal switching occurs at one of 2, 3, 4, 5 and 6 times a frequency of the at least one reference signal.

28. (original) A modulator-amplifier as set forth in claim 1, wherein the output signal comprises at least one of an upper sideband, a lower sideband, both upper and lower sideband.

29 -- 66. (Canceled)

67. (original) A modulator-amplifier configured for use in parametric sound reproduction systems, comprising:

- a reference signal generator for generating a reference signal;
- an event detector-signal generator comprising at least one comparator configured for comparing an input signal with the reference signal and generating a timing signal based upon detected events in the input signal;
- a switching power output stage configured for modulating the reference signal based upon the timing signal, whereby signal modulation is integrated with power amplification of the signal

to embody a non-linear relationship between the input signal and the timing of state transitions in the modulator-output stage.

68. (original) A modulator-amplifier as set forth in claim 67, wherein said non-linear relationship comprises an arcsine function.

69. (original) A modulator amplifier as set forth in claim 67, wherein the reference signal is one of lower-sideband, upper-sideband or dual-sideband modulated.

70. (original) A modulator-amplifier as set forth in claim 67, wherein the number of steady state levels in said switching power output stage is selected from the group consisting of: 2, 3, 4 or 5.

71. (original) A modulator-amplifier as set forth in claim 70, wherein switching within the switching power output stage occurs at one of 2, 3, or 4 times the frequency of the reference signal.

72. (original) A modulator-amplifier as set forth in claim 67, further comprising a power supply rejection circuit configured to mitigate variations in a supply voltage.

73. (original) A modulator-amplifier, comprising:

a carrier signal generator;

an event detector configured to generate a state change signal based upon detected events in an audio input signal, said event detector comparing the input signal to a reference signal;

a modulator-switching power output stage configured for modulating a carrier for parametric sound reproduction based upon the state change signal, and wherein the timing of switching between steady state levels in said output stage is related to the audio input signal by a non-linear function; and

wherein the switching frequency is selected from the group consisting of 2, 3, and 4 times the carrier frequency.

74. (original) A modulator-amplifier as set forth in claim 73, wherein the number of steady state levels is one of 2, 3, 4, and 5.

75. (original) A modulator-amplifier as set forth in claim 73, wherein the reference signal can be suppressed and the modulator amplifier-operated as a band-pass amplifier.

76. (original) A modulator amplifier as set forth in claim 73, configured for use in a SONAR application.

77 – 94, (Canceled)

95. (original) A modulator-amplifier as set forth in claim 10, comprising an application specific integrated circuit (ASIC).